REMARKS

The Examiner is respectfully requested to reconsider the rejection of Claims 1, 4, 7 and 8, under 35 U.S.C. 103(a) as being unpatentable over Muller (U.S. Patent 5,770,140) taken with Ciullo's *Rubber Formulary* in view of Domeier, et al. (U.S. Patent 6,422,528).

The object of the present invention is to form a microcontact printing stamp which possesses a minimum degree of printing distortion. The method of making the improved stamp of the present invention which stamp has a pattern for microcontact printing utilizes a siloxane composition as now defined specifically in Claim 1, wherein the siloxane composition is cured to fix its geometry while at or near the intended final use temperature (room temperature), followed by a higher temperature step to harden the siloxane composition, without substantially inducing geometry changes to the stamp and the pattern.

The Examiner has questioned the limitation of room temperature asserting in the Official Action that "practically any temperature can be described as 'room temperature,' as a room can be heated to practically any temperature." Applicant respectfully states that "room temperature" is a meaningful limitation which is well known in the art as evidenced by the articles attached here to as Exhibits A and B which indicate that the art recognizes "room temperature" as a temperature between 68° and 77° F (20° to 25° C).

Applicant teaches that the pattern fabricated onto the stamp should represent in detail the desired pattern intended to be printed. While this concept may appear in general to be obvious, the extraordinary detail that must be conveyed with microcontact printing makes this faithful representation easier to state as a goal than to realize in practice. Claim 1 now defines that the method results in an article having "precise dimensions."

The stamp, once made, must have mechanical properties, such as elastic modulus, that allow handling during printing, and minimum additional distortion from the stresses incurred during printing contact. While it is possible to do either separately, it has proven to be a severe fabrication challenge to achieve both simultaneously.

The Muller invention relates to curing silicone compositions to an elastomeric condition by heat. (Note that, as noted hereinafter, the Domeier patent is restricted to thermoplastic materials making the combination of these two references inappropriate.) Muller's system is dependent upon accelerators (specified peroxides) and fillers used in conjunction with the silicone. Note that the fillers in Muller are pre-treated or treated in situ by the addition of one or more treating agents during mixing of the composition. The language now in Claim 1 of "consisting essentially of" eliminates the use of fillers as a substantive component in the blend.

A major and significant difference between the present invention and Muller is the curing temperature used by Muller. Muller employs a curing temperature of 150° to 170° C, whereas Applicant uses a temperature of (as noted above) 20° to 25° C. Muller optionally uses the second cure in his method. Muller states: "*If desired, the initial cure step MAY be followed by a post-cure at higher temperature*" (i.e. higher than 150° to 170° C). After Applicant's first curing step is completed, the article (i.e. the stamp) is brought to a higher temperature, in the vicinity of 60 ° C, at which temperature a further cure continues thus attaining a higher elastic modulus. Upon cooling back to room temperature, the original pattern is restored without distortion and the stamp has the desired higher modulus. The extreme temperatures of Muller would defeat the whole purpose of the instant invention-retaining the precise dimension and high modulus. Muller is not focusing on those properties.

Applicant has explained in the specification that there are a number of sources for severe pattern distortion in the standard curing process such as the one disclosed by Muller, which result from the curing of the siloxane at higher temperatures than the final use temperature (room temperature). One reason for the distortion is that each component of the mold, including the master with glass and photoresist, flexible backplane, spacers, and mold housing expands with temperature changes according to the CTE of each. Thus, each component of the structure, being made of a different material with a different coefficient of expansion, expands disproportionally relative to each other, and to the original intended pattern. These will be the dimensions in place at the time of curing when the siloxane hardens into a stamp, and the pattern becomes fixed.

At this point, with the oven hot and after sufficient time for curing, the stamp possesses a pattern dimension that is related to the original master pattern according to the composite CTE of the master glass and photoresist. As the glass and photoresist will have expanded more or less uniformly, the stamp pattern will differ from the original in a relatively predictable way, which would be able to be reasonably compensated for by choice of an appropriately scaled master pattern to begin with. This sequence would produce a useful product if this were the end of the fabrication process, but it is not. Before the stamp is separated from the mold, the entire assembly must first be cooled down. During cooling, the master will shrink according to its moderate CTE (maybe 20 to 40 ppm). The stamp itself will shrink very significantly with a CTE of about 500 to 800 ppm, and the affixed backplane will shrink with a CTE of around 5 to 50 ppm, depending on the choice of material. It is this differential CTE between the permanently affixed backplane and the stamp that causes a complex pattern distortion that is sought to be avoided. Muller does not recognize this problem in his disclosure.

Muller's objective is not to form a stamp with fine definition that is needed to reproduce items, but rather he is seeking to accelerate the cure of siloxane elastomeric compositions but use of selected peroxides as curatives.

The pattern fabricated onto Applicant's stamp should represent in detail the desired pattern intended to be printed. While this concept may appear in general to be obvious, the extraordinary detail that must be conveyed with microcontact printing makes this faithful representation easier to state as a goal than to realize in practice. Note that the initial step of Applicant's cure requires lengthy period of time to accomplish. This is diametrically opposite to the objective of Muller. He seeks a faster cure at a much higher temperature. He also does not use a two step method and the fillers disclosed would not be useable in Applicant's final product.

The stamp, once made, must have mechanical properties, such as elastic modulus, that allow handling during printing, and minimum additional distortion from the stresses incurred during printing contact. While it is possible to do either separately, it has proven to be a severe fabrication challenge to achieve both simultaneously.

The Examiner has stated at several locations in the Official Action that *"by being in an enclosed mold, the retained mix therein will naturally maintain the precise dimension of the mold cavity."* There is no foundation for this assertion by the Examiner. The disclosure of Muller and what the Examiner is asserting in the Official Action is disclosed by Applicant to be the problem which he sought to solve in his discussion of the prior art on pages 4 and 5 of the specification. The Examiner has not cited a reference to support the "*natural*" or "inherent" maintaining of the precise dimension in an enclosed mold.

The Examiner concedes that the claimed curing temperatures between Muller and the present invention are different. It is in those differences that the patentability of the present invention resides. The specificities of the cited disclosures do not rise to the level required to qualify as appropriate references with respect to Applicant's invention. The Examiner has applied the Muller, Domeier (and Sangokoya) references, using <u>selective combinations</u> to render obvious the invention. The rejections use only so much of the disclosures found in the secondary references as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such references, alone and in combination fairly suggest to one of ordinary skill in the art.

The Examiner's obviousness rejection of the claims is incomplete as he has not provided the proper foundation for the rejection relating to her assertion that *"in a closed mold the article will maintain its shape and general size."* This portion of the rejection of claim 1 et seq., is based upon assertions by the Examiner as to the purported content of the prior art. 37 C.F.R. 1.104(d)(2) states "...When a rejection in an application is based on facts within the personal knowledge of an employee of the Office, the data shall be as specific as possible, and the reference must be supported, when called for by the Applicant, by the affidavit of such employee, and such affidavit shall be subject to contradiction or explanation by the affidavits of the applicant and other persons..." Applicants submit that the Examiner should comply with the excerpt of 37 CFR 104 cited above and provide the required information relating to the inherency to Applicant.

The Examiner is again requested to withdraw the Ciullo publication and the Domeier, et al references in view of the Declaration Pursuant to 37 CFR §1.131 which was attached in the prior submission and is again hereby incorporated by reference herein. Applicant had conceived and reduced to practice the subject matter of the invention prior to the publication and filing dates of the respective references. Applicant respectfully submits that, contrary to the Examiner's assertion in the Official Action, the Ciullo reference was cited as a part of the rejection of Claims 1, 4, 7 and 8. Applicant's submission in the prior response provided evidence that his invention was made prior to the availability of the Ciullo reference. Thus the skilled artisan would not have the Ciullo reference to consult at the time Applicant made his invention.

The Examiner is respectfully requested to reconsider the rejection of Claim 9, under 35 U.S.C. 103(a) as being unpatentable over Muller (U.S. Patent 5,770,140) and Domeier, et al. (U.S. Patent 6,422,528) (as applied to Claims 1 and 4) further in view of Sangokoya (U.S. Patent 5,731,253).

As noted above, the attention of the Examiner is respectfully directed to the fact that Domeier, et al. disclose as their matrix material, a *THERMOPLASTIC*, not a thermoset material. It is well known that "thermoplastics" soften under heat. *The Concise Chemical and Technical Dictionary,* Bennett, Chemical Publishing Company, (1986) at page 1126 states: "thermoplastic, softening under heat, a thermoplastic substance is adequately rigid st normal temperature and under normal conditions of stress but is capable of deformation under heat and pressure." Applicant's material, by virtue of its chemical structure is a thermoset material which: a material that will undergo or has undergone a chemical reaction by the action of HEAT, catalysts, ultraviolet light, etc., leading to a relatively infusible state." (*Id.*)

Examples of the materials used in Domeier, et al. include poly(methyl-methacrylate), but not elastomeric organic/inorganic polymers of the siloxane type. These are very different materials from the siloxane rubber disclosed and now claimed by Applicant.

Contrary to Domeier, et al., the present invention comprises simple molding techniques with respect to microcontact printing stamps, to achieve both the required dimensional integrity for pattern faithfulness and desired mechanical properties, primarily high elastic modulus. It teaches that with the vinyl addition type siloxane precursor mixtures (and others), where crosslinking (curing) can take place at either room temperature or higher temperature, a two-step cure produces the desired combination of properties. This is not possible with Dormeier, et al. in view of the materials disclosed therein.

As noted above, Applicant's first step is a room temperature cure, since generally room temperature is the condition at which the stamp will be ultimately used. The stamp is allowed to crosslink at room temperature for some period, <u>for example one week</u>. During this period of time, the stamp crosslinks and fixes the overall stamp geometry and the printing pattern. This was never contemplated by Domeier, et al. as evidenced in the disclosure.

After this curing step is completed, a second step commences wherein the stamp is brought to a much higher temperature, of 60° C, at which temperature a further cure continues thus attaining a higher elastic modulus. Upon cooling back to room temperature, the original pattern is restored without distortion and the stamp has the desired higher modulus. Again, Dormeier, et al. do not have such a disclosure to prepare such a product.

The two-step processing described above is used with the intention of using the first step to establish the precise dimension of the molded pattern. The step establishes not just the relative geometry, but also the resulting dimension by being held at a precise temperature within an enclosed mold. Then, once this dimension has been irrevocably established, the material is heated to a higher temperature for hardening.

Even though the material will (and does) expand during the higher temperature curing, it will (and does) shrink back to its original dimension again after cooling to the final use temperature. Neither Muller nor Domeier, et al. disclose such a phenomenon with their respective final products.

With respect to the references cited to Muller and Domeier, et al., not only do these patents deal with entirely different processes, but the disclosures are directed to area totally different from the teaching objective of the present invention.

The references, especially Muller who does disclose a cure, say nothing about maintaining a precise dimension. Shaping by molding does not address the specific "dimension" which Applicant needs for his invention to function properly. Further, Applicant submits that assuredly the Muller formed articles parts will undergo significant shrinkage during the higher temperature (150 °C - 170 °C), regardless of the Examiner's unsupported contentions. Applicant's temperature range for the second cure step is well- below the Muller range for cure.

Sangokoya, discloses an entirely different class of materials. These are aluminoxane derivatives and siloxy-aluminoxane materials used to enhance catalytic effect for polymerization. The reference speaks in general terms of reaction temperatures being in the range of 25 °C to 150 °C, but Sangokoya says nothing about tailoring curing conditions to precisely define the dimension and geometry of molded parts from these materials.

And more specifically, Sangokoya does not mention two step curing, or does he mention long carefully-controlled end-use temperature cures followed by high temperature hardening steps.

Applicant respectfully submits that the specificity of the Muller, Domeier, et al. and Sangokoya patent references do not rise to the level required to qualify as an appropriate reference with respect to Applicant's invention.

> *Further, the reference must describe the applicant's claimed invention sufficiently to have placed a person of ordinary skill in the field of the invention in possession of it.* (Citations omitted) <u>In re Lonnie T. Spada et al.,</u> 911 F.2d 705, 708 (Fed. Cir. 1990)

In view of the amendments and cancellations made herein, Applicant believes that the claims are in condition for allowance. However if there are issues arising by virtue of this amendment which could be resolved by a telephone conference, Applicant's attorney would be pleased to speak with the Examiner concerning such matter(s) at a mutually convenient time. The

Examiner is requested to contact Applicant's attorney by telephone.

Respectfully Submitted,

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I hereby certify that this paper is being mailed via First Class Mail postage prepaid on the date listed below addressed to Commissioner of Patents & Trademarks, Post Office Box 1450, Alexandria, VA 22313-1450.

Thomas A. Beck ---------------------------- August 19, 2005
Name: Thomas A. Beck

room temperature

Dictionary

room temperature
n. (*Abbr.* RT)

An indoor temperature of from 20 to 25°C (68 to 77°F).

WordNet

Note: click on a word meaning below to see its connections and related words.

The *noun* room temperature has one meaning:

Meaning #1: the normal temperature of room in which people live

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Wikipedia

room temperature

Room temperature, in laboratory reports, is taken to be roughly 21–23 degrees Celsius (70–73 degrees Fahrenheit), or 294–296 kelvins. The "standard" room temperature is 22 °C (72 °F or 295 K).

In describing an experiment, when researchers specify its temperature no more precisely than as "room temperature," this implies they have assumed that temperature differences of a few degrees do not matter to the phenomenon or question they were investigating. Typically researchers do not closely watch or control the temperature of a "room temperature" experiment.

The **phenomena** that researchers have chosen to study at room temperature may occur in nature in the range of 21–23 °C ("ATP consumption in resting cockroaches"), or they may not ("biochemistry of warm-blooded animals"). Researchers choose to study a process outside its natural temperature range when they expect that the answer to their specific question ("What is the product of this enzymatic reaction?") will be the same at room temperature as it would have been had they conducted their experiment at a more naturalistic temperature.

Experimentalists have an advantage in anticipating aspects of a room-temperature experiment, because the temperature is close to 25 °C (77 °F, 298 K), at which many of the material properties and physical constants in standards tables have been measured (more at standard state). By consulting such tables, a researcher may anticipate, for example, how fast a

Exhibit A

chemical reaction is likely to proceed.

Ultimately, a scientist conducts experiments at room temperature because it is convenient. The convenience may be only modest, as in cases where researchers might have performed a more realistic experiment simply by placing some material in an oven or refrigerator. Or it may be more like a necessity, as in cases where maintaining a firm control over the temperature of apparatus and the other elements involved would pose significant conceptual, technological or financial challenges.

When researchers have chosen either not to measure or not to control the temperature of an experiment; when they perform their experiment outdoors, or in a room where they perceive that the temperature varies either in time or in the space around an experiment; or when they simply sense that the temperature is beyond the range of 21-23 °C, they are liable to report that they conducted it at ambient temperature. Whether they do so may depend on whether they believe the process or question they are investigating could be sensitive to the size of the deviations from room temperature they expect.

Being a less precise specification than even "room temperature", "ambient temperature" is more certain to be accurate. Because scientists strive for accuracy in their reports, many use this specification exclusively just as a matter of course, even to describe experiments that they could justifiably characterize as having been conducted at room temperature.

Arguably, no precision is lost in this practice: In disciplines where experimenters always work in laboratories, and where temperature differences of a few degrees make little difference with regard to the questions that scientists ask, the distinction between ambient and room temperature literally is not worth making. And, of course, the ambient temperature of a room is room temperature.

Yet small temperature differences have large effects on many natural processes. Therefore scientists who do observe a distinction between the two specifications may be sticklers about which one to apply. For example, heat given off by electronics or motors may warm the area around an experiment relative to the rest of a room. Under such circumstances, and depending on the question under investigation, some scientists would consider it inaccurate to report that an experiment took place at room temperature.

See also: standard state

Mentioned In

room temperature is mentioned in the following topics:

cold rolling	at will (Idiom)
Enflurane	Thermal expansion coefficients of the elements (data page)
caponata	molecular compound
room temperature superconductor	saturated fat
unsaturated fat	burrata
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Word of the Day

derivative
Definition: (adjective) taken from a particular source.
Petersons.com

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room temperature

NOUN:
Abbr. **RT**

An indoor temperature of from 20 to 25°C (68 to 77°F).

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Exhibit B